Preface

In 1959, Richard Phillips Feynman (Nobel Laureate, Physics, 1965), the American theoretical physicist in his now-famous visionary talk on *There's Plenty of Room at the Bottom* explored the immense possibilities afforded by miniaturization and consequently established the foundation for the future wonders of nanoscience and nanotechnology. What was supposed to be impossible then, now is the real world—the nano world. At present, after more than half a century later, nobody would doubt considering the twenty-first century as the "Nano Era." Nanoscience and nanotechnology are based on the smallest unit of matter to engineer new materials and devices through monitoring atom-by-atom and molecule-by-molecule, targeting at achieving superior or unprecedented properties and performance, utilizing the atomic- or molecular-scale architectures.

In a composite material, there are at least two types of materials, one is the host and the other is the guest. In the nanocomposites, the guest has the dimension of the range 1-100 nm. Glass is an excellent host material owing to its several inherent superior properties compared to those of other similar encapsulating hosts. This fact has attracted the researchers exploring many types of glass nanocomposites depending on the varieties, sizes, and shapes of the nano guests as well as processing parameters. As a result, there are a wide range of reports in the published domain of the literature on glass nanocomposites. But there is no suitable book reviewing all these developments and recent literature. This book intends to fill this gap. This is as a consequence of the fact; a rapid development in a particular field requires a book which covers the forefront research in a widespread range including material synthesis, property evaluation, and applications.

This book contains 15 chapters which are divided into three parts. Part I is the introduction and it describes the fundamentals of glass and glass nanocomposites (Chapter 1). Part II covers oxide glass based different nanocomposites. These are glass-based nanocomposites (Chapter 2), crystallization, and growth mechanisms of nanostructures in silicate glass: from complete characterization towards applications (Chapter 3), laser annealing of metal nanoparticles synthesized in glasses by ion implantation (Chapter 4), enhanced photoluminescence and planar waveguide of rare-earth doped germanium oxide glasses with metallic nanoparticles (Chapter 5), sol-gel synthesis of metal nanoparticle incorporated oxide films on glass (Chapter 6), nonlinear optical properties of metal nanoparticles in silicate glass (Chapter 7), electrical transport properties of ion-conducting glass nanocomposites (Chapter 8), plasmonic antimony and bismuth oxide glass nanocomposites: synthesis and enhanced photoluminescence (Chapter 9), silver glass nanocomposites: preparation, properties, and applications (Chapter 10), functionality of reversible glass nanocomposites and their applications (Chapter 11), semiconductor glass nanocomposites: preparation, properties, and applications (Chapter 12), and advanced glass-ceramic nanocomposites for structural, photonic and optoelectronic applications (Chapter 13). Part III discusses nonoxide glass based different nanocomposites, which